



SKILLSHEET 10.4

Calculating compound interest

The amount (A) to which an investment will grow under compound interest can be calculated using the formula:

$$A = P(1 + r)^n$$

where P = initial quantity

r = interest rate per period expressed as a decimal

n = number of interest periods.

To calculate the amount of compound interest earned, we need to subtract the initial quantity (P) from A . As a formula we can write:

$$CI = A - P$$

WORKED EXAMPLE 1

Calculate the amount to which \$2000 will grow when invested at 5.75% p.a. for 4 years with interest compounded annually.

THINK

- 1 Calculate the value of r by converting the interest rate to a decimal.
- 2 Write the formula.
- 3 Substitute in the values of P , r and n .
- 4 Simplify the expression in brackets.
- 5 Calculate and round off to the nearest cent.

WRITE

$$\begin{aligned} r &= 5.75 \div 100 \\ &= 0.0575 \\ A &= P(1 + r)^n \\ &= \$2000(1 + 0.0575)^4 \\ &= \$2000(1.0575)^4 \\ &= \$2501.22 \end{aligned}$$

You also need to make adjustments for a different compounding period. If, for example, interest is compounded six-monthly, the interest rate, r , needs to be halved and the value of n will be twice the number of years.

WORKED EXAMPLE 2

Calculate the amount of interest earned on an investment of \$6000 when invested at 6.4% p.a. for 3 years with interest compounded quarterly.

THINK

- 1 Calculate the value of r by dividing the interest rate by 4 and converting to a decimal.
- 2 Calculate the value of n by multiplying the number of years by 4.
- 3 Write the formula.
- 4 Substitute in the values of P , r and n .
- 5 Simplify the expression in brackets.
- 6 Calculate and round off to the nearest cent.
- 7 Calculate the interest by subtracting the initial quantity.

WRITE

$$\begin{aligned} r &= 6.4\% \div 4 \\ &= 1.6\% \\ &= 1.6 \div 100 \\ &= 0.016 \\ n &= 3 \times 4 \\ &= 12 \\ A &= P(1 + r)^n \\ &= \$6000(1 + 0.016)^{12} \\ &= \$6000(1.016)^{12} \\ &= \$7258.98 \\ CI &= A - P \\ &= \$7258.98 - \$6000 \\ &= \$1258.98 \end{aligned}$$



Try these

- 1** Calculate the amount to which each of the following investments will grow.
 - a** \$12 000 at 7% p.a. for 4 years with interest compounded annually
 - b** \$27 500 at 8.4% p.a. for 3 years with interest compounded annually
 - c** \$9250 at 6.95% p.a. for 5 years with interest compounded annually
 - d** \$20 000 at 8% p.a. for 6 years with interest compounded semi-annually
 - e** \$16 750 at 9.5% p.a. for 3 years with interest compounded semi-annually
 - f** \$120 000 at 8% p.a. for 5 years with interest compounded quarterly
 - g** \$5400 at 5.2% p.a. for 3 years with interest compounded quarterly
 - h** \$32 000 at 9% p.a. for 2 years with interest compounded monthly
- 2** Calculate the amount of compound interest earned on each of the following investments.
 - a** \$7500 at 11% p.a. for 3 years with interest compounded annually
 - b** \$16 850 at 7.5% p.a. for 5 years with interest compounded annually
 - c** \$6590 at 9.95% p.a. for 4 years with interest compounded annually
 - d** \$84 000 at 9% p.a. for 5 years with interest compounded semi-annually
 - e** \$19 850 at $6\frac{1}{4}\%$ p.a. for 3 years with interest compounded semi-annually
 - f** \$44 000 at 6% p.a. for 2 years with interest compounded quarterly
 - g** \$25 800 at 12.9% p.a. for 5 years with interest compounded quarterly
 - h** \$100 000 at 15% p.a. for 3 years with interest compounded monthly

SKILLSHEET — ANSWERS

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|------------------------|-----------------------|
| 1 a \$15 729.55 | b \$35 028.42 |
| c \$12 943.42 | d \$32 020.64 |
| e \$22 127.84 | f \$178 313.69 |
| g \$6305.32 | h \$38 285.23 |
| 2 a \$2757.23 | b \$7340.35 |
| c \$3040.89 | d \$46 449.43 |
| e \$4025.05 | f \$5565.67 |
| g \$22 876.30 | h \$56 394.38 |